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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/977,681	10/16/2001	Shinji Yoshihara	15-015	3846

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EXAMINER

BAUMEISTER, BRADLEY W

ART UNIT PAPER NUMBER

2815

DATE MAILED: 08/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.  
09/977,681

Applicant(s)  
Yoshihara et al.

Examiner  
B. William Baumeister

Art Unit  
2815



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Apr 30, 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 6-8, 10, and 11 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 6-8, 10, and 11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_ 6) ☐ Other:

Art Unit: 2815

## **DETAILED ACTION**

### ***Allowable Subject Matter***

1. The indicated allowability of previously numbered claim 10 (now claim 6 as amended) is withdrawn in view of further consideration of Abe 670 (the corresponding to the 09/120, 803 application that was cited in IDS #7). New rejections based on the cited reference(s) follow.

### ***Claim Rejections - 35 USC § 102 / § 103***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

3. Claims 6-8 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Abe '670.

a. Abe '670 claims foreign priority to *inter alia* JPO publication 10-157917, having a corresponding application number of JP-A-11-97413 which, in turn, was cited as prior art in the background section of the present application at page 1, line 24).

Art Unit: 2815

b. As acknowledged by Applicant, Abe '670 teaches Si wafers that are subsequently singulated into discrete diaphragms. (See e.g., FIGs 10, 16 and 50 of Abe '670 and the present specification's explanation in the BACKGROUND section at page 2, lines 4- that the substrate of JP '413 is subsequently diced along the conductor lines.)

c. The Abe '670 wafers (see e.g., FIG 50) include a p-substrate (rear portion) 111; an n-type epi layer (front portion) 112 with p-type sensing elements 113 formed therein; and p<sup>+</sup> isolation diffusion regions 114 formed on and along the pn junction interface with a pattern for permitting the front and rear portions to directly contact each other at a position below the diaphragm. The substrate is processed by an anisotropic etch followed by an isotropic etch which results in the diaphragms having cavities with rounded corners.

d. FIG. 10 depicts the p-isolation regions 63 as being slightly wider than, but approximately the same width as, the metal contacts 64 that are to be subsequently removed during the scribe step. The p-isolation regions are also substantially spaced laterally apart from the portions of the p-substrate 11 that are to be etched into cavities. In contrast to the FIG 10 embodiment, Fig 50 depicts that p<sup>+</sup> diffusion regions 114 may alternatively be substantially wider than in the FIG 10 embodiment, may extend significantly farther laterally than the p contacts 115, and which are not spaced apart from the substrate cavities, but rather extend laterally to overlap the edges of the cavity. As such, while Abe '670 does not expressly depict the lateral boundaries of the scribe regions, in the FIG 50 embodiment some of the p-diffusion region would necessarily have to remain at the diaphragm's side faces subsequent to the scribe step because if the scribing

Art Unit: 2815

saw were alternatively so wide as to consume all of the p diffusion region 114, the scribe region would extend into the diaphragm cavity rendering the device unusable for its intended purpose. As such, the claims are anticipated.

i. Regarding claim 8, Abe also teaches the first limitation that the sensor has a rectangular plane shape (“power supplying electrodes 115 made of aluminum are formed to constitute, for example, substantially a lattice shape as a whole.” col. 24, lines 35-37).

e. Alternatively, even assuming *arguendo* that it would be possible to scribe the embodiment of FIG 50 in such a manner that the P+ diffusion region 115 would not necessarily be present at the p-n junction interface (and thereby precluding the above inherency-based 102 rejection), it would have been obvious to one of ordinary skill in the art at the time of the invention to have limited the lateral width of the scribe region to the greatest extent possible (i.e., to set the scribe width to be only wide enough to remove the contacts 115 while minimizing the amount of p+ diffusion 114 region that is removed) for the purpose of maximizing the area of the remaining non-cavity portion of the respective diaphragms so as to thereby improve the substrate’s structural integrity.

4. Claims 6-8 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP 11-354816 (a Japanese patent document corresponding to application number JP 10-157916 to which Abe ‘670 also claims foreign priority) for the reasons set forth above in relation to Abe ‘670 (see e.g., Fig 9).

Art Unit: 2815

*Allowable Subject Matter*

5. The following is a statement of reasons for the indication of allowable subject matter:

a. The claims would be allowable if the independent claim(s) are amended to clarify that the recited “diffused layer” is “a buried diffused layer” and further clarify that no such high-concentration diffusion regions are exposed at the side faces of the diaphragm at the surface of the n-epi layer (or “front portion”). The latter limitation would be necessary because it was well known to form diffusion isolation structures--that are functionally equivalent to that of region 114--through a two step process including a surface diffusion region and a buried diffusion region wherein the two subregions have substantially the same lateral width (see e.g., Toyoda ‘717 P+ having a buried and surface isolation diffusion regions 22 and 23). Restated, Abe ‘670 does not reasonably suggest providing an isolation diffusion region having a wider buried portion along the interface such that the lower portion substantially remains after the scribing step while the upper, surface portion is effectively removed by the scribing step.

*Response to Arguments*

6. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Art Unit: 2815

*Conclusion*

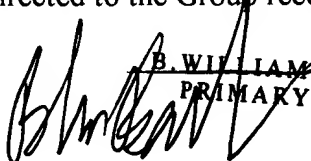
7. Applicant's amendment filed 12/2/2002 (paper #8) necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Art Unit: 2815

**INFORMATION ON HOW TO CONTACT THE USPTO**

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, **B. William Baumeister**, at **(703) 306-9165**. The examiner can normally be reached Monday through Friday, 8:30 a.m. to 5:00 p.m. If the Examiner is not available, the Examiner's supervisor, Mr. Eddie Lee, can be reached at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

  
**B. WILLIAM BAUMEISTER**  
**PRIMARY EXAMINER**

B. William Baumeister

Primary Examiner, Art Unit 2815

~~July~~ 2, 2003

August

bwb